

Course Type	Course Code	Name of Course	L	T	P	Credit
DE5	MND 404	MINE SYSTEM ENGINEERING	3	0	0	9

Course Objective

With the growth of engineering skills over time, the emphasis has shifted from “production and product at any cost” to conservation of resources through their optimal utilization resulting in minimum cost. Engineers and managers responsible for strategic as well as routine decision making must be armed with tools and techniques of quantitative decision making. The objective of this course is to empower the future managers with such tools and techniques.

Learning Outcomes

By completing the course the students will become fully conversant with the methods and applications of quantitative decision making tools prescribed in this course. Learning these tools will prove immensely helpful to students in taking rational decisions in their professional life.

Sl. No.	Course contents	No. of Lectures	Learning outcome
1	Introduction to Mine Systems Engineering: Definition and concept of system, sub-systems and system environment; Classification of systems; Systems analysis; Mine as a system and its subsystems	2	students will know exactly what a system is and its components, interrelation amongst subsystems and the surrounding environment
2	Linear Programming: Linear Programming models; Assumptions of linear programming, Concepts of Basic solution, Basic feasible solution and optimal solution. Generalized Linear Programming model., Standard form of L.P model, Graphical and SIMPLEX methods of solving Linear Programming Problems; Standard and mixed type of Linear programming and their solution methods. Interpretation of coefficients and parameters in SIMPLEX table. Primal and Dual Problems and rules for conversion. Application of Linear Programming for solution of mining oriented problems on production planning, scheduling, blending etc.	12	given the problem description, students will learn formulation of problems, methods to solve and making interpretation of the results. Sensitivity analysis explains in much better way as to what changes can be expected in the results if there is any variation in the parameters.
3	Transportation and Assignment Models Transportation models, Stepping Stone and Modified Distribution (MODI) Algorithms for solution of Transportation problems, Variations/ Aberrations in classical Transportation models and their solution methods. Assignment model and solution algorithm, Variations/ aberrations in Classical Assignment models and methods to tackle such aberrations. Application to mining oriented problems.	8	Transportation and Assignment problems are helpful in assigning material/ personnel in most economic manners. Though such problems can also be solved by Linear programming methods but definite and better algorithm are available for solving such problems in minimum possible time.
4	Project Management with PERT & CPM: Assumption of PERT and CPM; Methods of drawing network; Redundancy and identification of redundant jobs; Algorithm for Critical path calculation, Criticality index; Statistics related to PERT; Probability of completing a project by a due date, Lowest cost schedule using Critical Path	8	Students will learn to generate vital information required for meaningful utilisation of resources during the implementation phase of projects.

Shamika Bacher
31/9/24

Dipankar
31/9/24

S. N. S.
31/5/24

P. V.
31-05-2024

R. P.
31/05

Sl. No.	Course contents	No. of Lectures	Learning outcome
	Method(CPM).		
5	Inventory management: Introduction, components, nature and classification of inventory problems,; Static and dynamic inventory problems, Classical Economic Order Quantity (E.O.Q) model; Rounding off order cycle, EOQ model with quantity discount.	8	Maintenance of inventory causes locking up of a vast capital. Students will learn how to optimise the inventory resulting into minimum inventory cost. It becomes more important under certain constraint such as space or budgetary constraint.
6	Simulation: Introduction and concept of simulation; Scope and limitation; Monte-Carlo simulation; Simulation for equipment selection and inventory systems in mines.	4	There are problems which are not amenable to solution by available analytical methods. Simulation provides more rational answer to such problems. Student to come to know the techniques of doing simulations.

Text Books;

1. Operations Research, Principles and Application by G Srinivasan,
2. A Management Guide to PERT and CPM by Jerome D Wiest and Ferdinand K Levy

Reference Books:

1. Introduction to operations Research by F S Hillier and G J Lieberman
2. Principles of Operations Research for Management by F.S Budnich, D Mcleavey & R Mozena
3. System Analysis and Project Management by D.I Cleland & William R King
4. Principles of Operations Research by H M Wagner
5. Optimization – Theory and Application by S S Rao
6. Introduction to Operations Research by Billy E Gillet
7. Quantitative Technique for Managerial Decision Making by U K Srivastava, G V Shenoy, S C Sharma
8. System Simulation with Digital Computers by Narsingh Deo
9. Inventory – theory and practice by Star & Miller

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